

TDC



Theater Deployable Communications

Baseline Requirements Document

TSSR Interface Unit

TIU (v2)

Nov 2003

ESC/NI4T
5 Eglin Street
Hanscom AFB, MA 01731

Approved for public release; distribution is unlimited.

Table of Contents

1.0 SCOPE - - - - -	6
2.0 APPLICABLE DOCUMENTS - - - - -	7
3.0 REQUIREMENTS - - - - -	8
3.1 Module Definition - - - - -	8
3.2 Performance Capabilities- - - - -	9
3.2.1 Electrical Interface (External)- - - - -	9
3.2.1.1 Prime Power - - - - -	10
3.2.1.2 Connector - 10BaseFL/100BaseFX Backbone - - - - -	10
3.2.1.3 Connector - DS1 Backbone (ISDN PRI trunk) - - - - -	10
3.2.1.4 Connector - Router Configuration and Status- - - - -	11
3.2.1.5 Connector - Baseband data RX - - - - -	11
3.2.1.6 Connector - Baseband data TX - - - - -	11
3.2.2 Electrical Interface (Internal) - - - - -	11
3.2.3 Functional Requirements - - - - -	11
3.2.3.1 TSSR Interface – MUX (4 x T1)- - - - -	11
3.2.3.2 Cisco 2621XM Modular Access Router - - - - -	11
3.2.3.3 Router Configuration & Status- - - - -	12
3.2.3.4 SI Tech T1 Fiber Optic Bit Driver - - - - -	12
3.2.4 Configuration Options - - - - -	12
3.2.5 Physical Characteristics - - - - -	12
3.2.5.1 Transit Case - - - - -	12
3.2.5.2 Weight - - - - -	12
3.2.5.3 Storage Space - - - - -	12
3.2.5.4 Lightning Protection/Power Line Conditioning - - - - -	12
3.2.5.5 Marking - - - - -	13
3.2.5.6 Cables and Accessories - - - - -	13
3.2.6 Reliability - - - - -	13
3.2.7 Maintainability- - - - -	13
3.2.7.1 Mean Time Between Preventive Maintenance - - - - -	13
3.2.8 Environmental Conditions - - - - -	14
3.2.8.1 Temperature - - - - -	14
3.2.8.2 Relative Humidity - - - - -	14
3.2.8.3 Altitude - - - - -	14
3.2.8.4 Sand and Dust - - - - -	14
3.2.8.5 Shock - - - - -	15
3.2.8.6 Vibration - - - - -	15
3.3 Design and Construction - - - - -	15
3.3.1 Material Parts and Processes - - - - -	15
3.3.2 Safety - - - - -	15
3.3.2.1 Electrical Safety - - - - -	15
3.3.2.2 Mechanical Safety - - - - -	15
3.4 Logistics - - - - -	15
4.0 QUALITY ASSURANCE PROVISIONS - - - - -	17

4.1 General - - - - -	17
4.2 Responsibility for Inspection - - - - -	17
4.3 Product Qualification Test (PQT)- - - - -	17
4.4 Production Acceptance Test (PAT) - - - - -	17
4.5 Verification Cross Reference Matrix (VCRM) - - - - -	17
4.5.1 Not Required (N/R) - - - - -	17
4.5.2 Inspection - - - - -	17
4.5.3 Analysis - - - - -	18
4.5.4 Demonstration - - - - -	18
4.5.5 Test - - - - -	18
5.0 PREPARATION FOR DELIVERY - - - - -	21
6.0 Baseline Configuration - - - - -	22
6.1 Equipment - - - - -	22
6.2 Elevation Drawings - - - - -	24
6.3 Cable Diagrams - - - - -	26
6.4 Interconnection Diagrams - - - - -	37

List of Tables

Table 1 - Standards and Applicable Documents - - - - - 7

Table 2 - TIU External Interface Characteristics - - - - - 10

Table 3 - Pin Assignments, Router Configuration and Status Connector - - - - - 11

Table 4 - Cables included with TIU - - - - - 13

Table 5 - MTBF of Major Components - - - - - 13

Table 6 - Module Temperature Characteristics - - - - - 14

Table 7 - Module Humidity Characteristics - - - - - 14

Table 8 - Module Altitude Characteristics - - - - - 14

Table 9 - Verification Cross Reference Matrix - - - - - 18

Table 10 - Equipment Listing - - - - - 22

Table 11 - Cable Diagrams - - - - - 26

List of Figures

Figure 1 - TSSR Interface Unit Application in TDC ICAP	- 8
Figure 2 - TSSR Interface Unit Block Diagram (Internal Functions)	- 9
Figure 3 - Front Elevation	24
Figure 4 - Rear Elevation	25

1.0 SCOPE

This requirements document establishes the performance, manufacture and test requirements for the TDC ICAP TSSR Interface Unit v2.

2.0 APPLICABLE DOCUMENTS

To the extent specified herein, the following documents of latest current issue on the date of this Baseline Requirements Document form part of this BRD.

Table 1 - Standards and Applicable Documents

Document Number	Title
IEEE 802.3	Carrier Sense Multiple Access with Collision Detection (CSMA/CD) access method and physical layer specification.
EIA/TIA-232-E	Interface between Data Terminal Equipment and Data Circuit-Terminating Equipment employing serial binary data interchange (rates to 20 Kbps) (July 1991).
MIL-STD-810F	Environmental Test Methods
	TDC Standards Document

3.0 REQUIREMENTS

3.1 Module Definition

The TIUv2 provides voice and data interfaces between the ICAP modules and the AN/GRC-239 Tropo/Satellite Support Radio (TSSR). The TIUv2 has 2 ISDN PRI fiber optic interfaces and one 10BaseFL and one 100BaseFX Ethernet interface. A digital multiplexer internal to the module provides 4xDS1-transmission capability over the conventional analog TSSR radio. Two of the DS1s are interfaced to the ISDN PRI trunks via a dual DS1 fiber optic modem. The other two DS1s are connected to the 10BaseFL/100BaseFX Ethernet interfaces via an IP router within the module and fiber optic Bridging Media Converters. A functional block diagram showing the TIUv2 function in the TDC ICAP is shown in Figure 1.

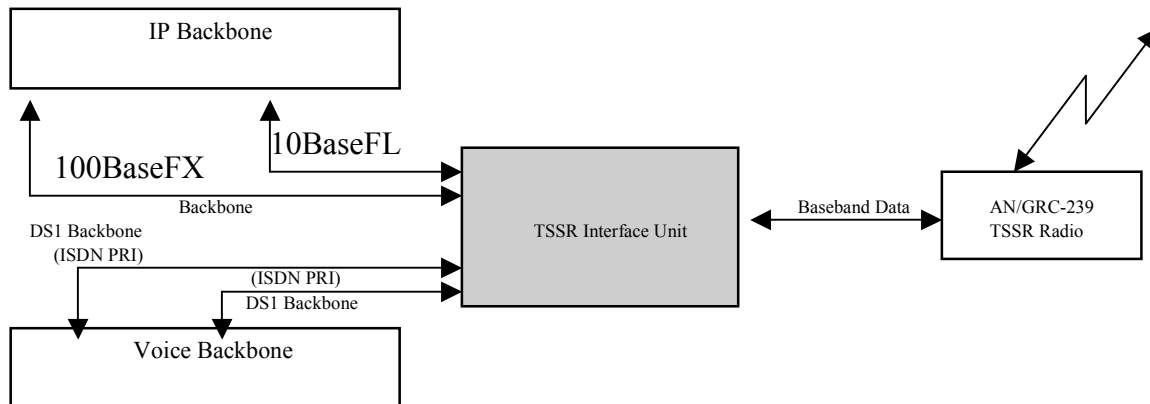


Figure 1 - TSSR Interface Unit Application in TDC ICAP

Figure 2 provides a block diagram of the TSSR Interface Unit v2 showing internal module functions.

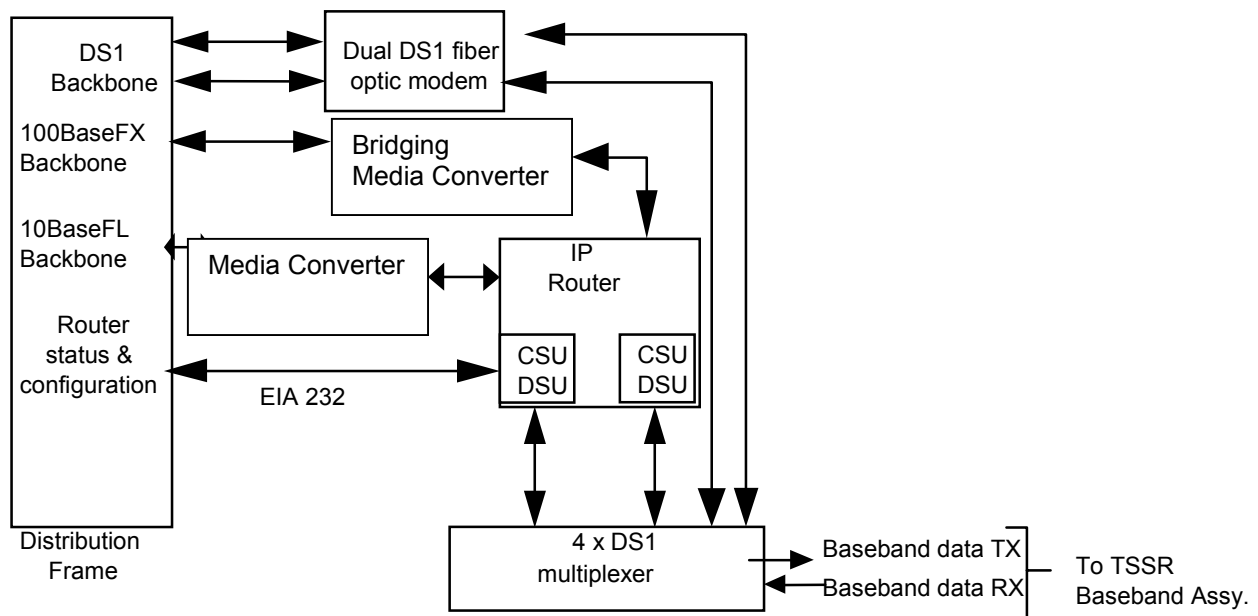


Figure 2 - TSSR Interface Unit Block Diagram (Internal Functions)

ISDN PRI and Ethernet IP data signals are input to the TIUv2 Module through fiber optic I/O ports on the module's distribution frame. Up to two ISDN PRI trunk signals are routed through a dual DS1 fiber optic modem to convert the signals from optical to electrical. These two voice signals are directly input to two of the DS1 ports on the multiplexer.

The Ethernet IP data signal is routed through a fiber optic transceiver and a Bridging Media Converter to convert the signals from optical to electrical. The TIUv2 Module uses an IP router with 2 fixed 10/100BaseT Ethernet port(s) for interfacing with the fiber optic transceiver and the bridging media converter. It has two integral T1 CSU/DSUs to route ICAP data to/from DS1 circuits in the multiplexer. The two CSU/DSU connections are direct input to the remaining two DS1 ports on the multiplexer.

The 4xDS1 multiplexer combines four DS1 channels into an aggregate analog waveform that is compatible (signal level and bandwidth) with the TSSR transmitter baseband module. This function enables the communication of the four DS1 channels over a conventional AN/GRC-239 TSSR.

3.2 Performance Capabilities

3.2.1 Electrical Interface (External)

Access to the TSSR Interface Unit v2 is through the module's Distribution Frame (DF) shown in Figure 4. The DF is internally wired to provide all required connections, except the input power. The input power connection is at the power conditioner. The access ports on the DFs include the number and type of external interfaces presented in Table 2.

Table 2 - TIU External Interface Characteristics

Signal Name	Quantity	Connector	Primary Interface	Electrical Characteristics
Prime Power	1	IEC-320	Power source	100 - 240 VAC, 47 - 63 Hz
10BaseFL/ 100BaseFX Backbone	2	2ea. ST 2ea. ST	BAM, Red Router or Red Hub	10BaseFL, 100BaseFX, Ethernet. (multi-mode fiber optic cable)
DS1 Backbone (ISDN PRI trunk)	2	2ea. ST 2ea. ST	BAM, Legacy/PTT	ISDN PRI (1.544 Mbps) modulated onto proprietary multi-mode fiber optic carrier.
Router configuration & status	1	1ea. DB9	User laptop/PC	EIA/TIA-232E
Baseband data RX	1	1ea. BNC	TSSR baseband assembly output	Adaptive Broadband proprietary (cable provided)
Baseband data TX	1	1ea. BNC	TSSR baseband assembly input	Adaptive Broadband proprietary (cable provided)

3.2.1.1 Prime Power

The TSSR Interface Unit v2 is designed to operate from 100 - 240 VAC, 47 - 63 Hz, single phase, and three-wire power. The TIUv2 includes an internal power conditioner to minimize line variation and transients. The module's prime power connector is an IEC 320 (male) type.

3.2.1.2 Connector - 10BaseFL/100BaseFX Backbone

The 10BaseFL/100BaseFX Ethernet connectors are fiber optic ST type connectors. The output connectors are labeled TX and the input connectors are labeled RX.

3.2.1.3 Connector - DS1 Backbone (ISDN PRI trunk)

The DS1 Voice connectors are fiber optic ST connectors. The output connector labeled TX and the input connectors are labeled RX.

3.2.1.4 Connector - Router Configuration and Status

The Router Configuration and Status connector is a DB9 jack (female) type connector, supporting VT100 terminal emulation (9600 baud, 8 bits, No parity, 1 stop). Pin assignments are as shown in Table 3.

Table 3 - Pin Assignments, Router Configuration and Status Connector

Pin	Signal	I/O	Pin	Signal	I/O	Pin	Signal	I/O
1	Shield Ground	-	4	N/C	-	7	N/C	-
2	TX Data	O	5	Signal Ground	-	8	N/C	-
3	RX Data	I	6	N/C	-	9	N/C	-

3.2.1.5 Connector - Baseband data RX

The TSSR Baseband Assembly Output connector is a BNC, jack (female) type connector.

3.2.1.6 Connector - Baseband data TX

The TSSR Baseband Assembly Input connector is a BNC, female type connector.

3.2.2 Electrical Interface (Internal)

Internal wiring of the major module components can be found in Paragraph 6.4.

3.2.3 Functional Requirements

3.2.3.1 TSSR Interface – MUX (4 x T1)

- Maximum data transfer rate is 6.312Mbps (4 x 1.544 Mbps)
- Interface directly to AN/GRC-239 TSSR 15GHz radio
- Four T1 inputs
- Rx and Tx Alarms

3.2.3.2 Cisco 2621XM Modular Access Router

The Cisco 2621XM Multiservice router provides the capability to process packets at 30Kpps.

Additional features and capabilities are listed below:

- Cisco IOS Version 12.1(9) with the IP Plus feature set (supports OSPF and BGP-4 routing protocols)
- 2 T1/FT1 interfaces are provided for CSU/DSU functions necessary to interface with the TSSR Multiplexer
- 16 MB FLASH Memory (factory default)
- 32-64 MB DRAM factory upgrade installed
- 2 Fixed 10/100baseT Ethernet Ports
- 1 Network Module Slot

- 2 Integrated WIC slots/ 1 Advanced Integration Module (AIM) slot

3.2.3.3 Router Configuration & Status

The router configuration and status port provides an RS-232 connection to allow the router to be configured and monitored using a laptop or PC.

3.2.3.4 SI Tech T1 Fiber Optic Bit Driver

- Dual T1 (DS1) AMI or B8ZS to Fiber Optic
- Status indicators and alarms
- Synchronous, half/Full duplex operation
- Dual channel in 1U chassis

3.2.4 Configuration Options

No current ICAP configuration kit is directly applicable to the TIU. Many of the system level and maintenance kits can be used for module troubleshooting and cable repair. These kits include:

- Fiber Cable Kit
- Laptop Computer Kit
- Small UPS Kit

3.2.5 Physical Characteristics

3.2.5.1 Transit Case

The module is housed in an 11U man-transportable container (transit case), approximately 22.5"W x 34.5"D x 23.4"H. The transit case is designed to stack on top of, and mechanically interlock to, like cases. Transit cases with their covers in place are designed to protect the electronic equipment inside from direct exposure to environmental conditions; e.g., rain, snow, ice, dust, etc., likely to be encountered during world wide military transit.

3.2.5.2 Weight

The module weight, including all internally carried cables, does not exceed 150 pounds.

3.2.5.3 Storage Space

The module includes storage pouches within its covers and a sliding storage drawer inside the transit case to store cables, manuals, etc. that must be transported and used with the module.

3.2.5.4 Lightning Protection/Power Line Conditioning

The module has power conditioning on its prime power input lines and provide lightning protection via the fiber optic interfaces to prevent module damage caused by nearby lightning strikes.

3.2.5.5 Marking

See TDC Standards Document for required markings.

3.2.5.6 Cables and Accessories

The following cables are delivered with each module to facilitate connection to the TSSR baseband assembly.

Table 4 - Cables included with TIU

Function	Color Code	Quantity	Description
Admin Cable	Yellow/White	1	Module Admin Cable (stored in pouch)
ST-ST Fiber Optic Cable	Yellow/White	2	Fiber Optic Cable (stored in pouch)
Cable Reel Assembly	Yellow/White	1	RG-59 Cable (on reel)
Power Cable	Yellow/White	1	IEC-320 C20 Jack to NEMA 5-15P

3.2.6 Reliability

The module with its standard complement of LRUs, have a mean time between failure (MTBF) commensurate with similar commercial equipment in its class. The actual MTBF for the major system components are shown in Table 5. Where Reliability data is not readily available from the vendor, this is indicated.

Table 5 - MTBF of Major Components

Component	MTBF
TSSR Interface Mux (4xT1)	Not Available
SI Tech Bit Driver	Not Available
Cisco 2621XM Router	20,000 to 50,000 hour typical of Cisco routers

3.2.7 Maintainability

Maintainability characteristics will be part of the selection criteria for all hardware. Ease of maintenance, such as accessibility to Line Replaceable Units, fault detection/isolation software capability, and fault annunciation will be considered.

3.2.7.1 Mean Time Between Preventive Maintenance

The Mean Time Between Preventive Maintenance, during operation, is 30 days. The duration of preventive maintenance actions such as corrosion control, cleaning filters, etc., does not exceed 30 minutes.

3.2.8 Environmental Conditions

During storage, transport and operation the modules can withstand exposure to temperatures as shown in Table 6.

3.2.8.1 Temperature

Temperature characteristics for the major equipment components are shown in Table 6.

Table 6 - Module Temperature Characteristics

Equipment	Temperature (degrees C)	
	Operating	Non-Operating
TSSR Interface Mux (4xT1)	0 to 50	Not Available
SI Tech Bit Driver	0 to 40	-40 to 85
Cisco 2621XM Router	-20 to 50	Not Available

3.2.8.2 Relative Humidity

Relative humidity characteristics for the major equipment components are shown in Table 7.

Table 7 - Module Humidity Characteristics

Equipment	Humidity
	Non-condensing
TSSR Interface Mux (4xT1)	0 to 95%
SI Tech Bit Driver	5 to 95%
Cisco 2621XM Router	0 to 95%

3.2.8.3 Altitude

Altitude characteristics for the major equipment components are shown in Table 8.

Table 8 - Module Altitude Characteristics

Equipment	Altitude (feet)	
	Operating	Non-Operating
TSSR Interface Mux (4xT1)	Not Available	Not Available
SI Tech Bit Driver	Not Available	Not Available
Cisco 2621XM Router	Not Available	Not Available

3.2.8.4 Sand and Dust

During storage and transport, the modules are protected when exposed to sand and dust in accordance with the best commercial practices for close proximity to operating aircraft. During

operation with covers removed, the modules can withstand sand and dust in accordance with the best commercial practices for natural conditions.

3.2.8.5 Shock

Module equipment racks are equipped with rubber shock isolation mounts and is protected from shocks induced during handling, setup and tear down. Modules and components can operate without degradation following exposure to the non-operating shock environment described by Method 516.5, Procedure VI (Bench Handling) of MIL STD 810F.

3.2.8.6 Vibration

The modules are equipped with rubber shock isolation mounts so that the modules can withstand the vibration encountered while being transported by commercial and military airlift, sealift and vehicular (over unimproved roads) systems. MIL-STD-810F, Method 514.5, Procedure I, Categories 4, 7 and 8. applies; alternative procedures may be substituted after TDC Program Office approval.

3.3 Design and Construction

3.3.1 Material Parts and Processes

This module is built to good commercial practices. Mechanical and electrical interchangeability exists between like systems, subsystems, assemblies, subassemblies and replaceable parts.

3.3.2 Safety

This module shall not present a safety, fire or health hazard to personnel.

3.3.2.1 Electrical Safety

This module is designed to eliminate the hazard to personnel of inadvertent lethal voltage contact. All electrical conductors carrying voltages in excess of 70 volts shall be insulated to prevent contact or covered by a protective barrier. All removable protective barriers shall be interlocked to automatically disconnect power behind the barrier upon removal or clearly marked with a warning label that indicates the voltage potential that will be encountered behind the barrier. All warning labels shall remain visible after the cover has been removed.

3.3.2.2 Mechanical Safety

Sharp surfaces shall have protective covers or other suitable features to minimize injury where personnel are likely to be exposed to such surfaces.

3.4 Logistics

This module accommodates a two level maintenance concept: organizational (Air Force personnel) and depot (contractor personnel). Removal and replacement of an LRU is defined at

the organizational level and any needed repair of the LRU is defined at the depot level. Any special test or support equipment required to effect removal or replacement of an LRU at the organizational level can be provided as part of the module. No more than two persons shall be required to remove or replace an LRU.

An LRU is defined as the lowest element of the module which can be isolated to be faulty through inspection; built-in test; technical manuals; TDC-ICAP system performance; spares substitution; or other diagnostic aid approved by the Government for organizational level maintenance, exclusive of expendables such as fuses, lamps and LEDs. An LRU is defined at the card/module level or higher.

4.0 QUALITY ASSURANCE PROVISIONS

4.1 General

The quality assurance program includes tests and other evaluations to the extent specified herein. The quality assurance program is designed to verify the electrical, mechanical and functional characteristics of each module. The purpose is to ensure that each module complies with or performs better than the requirements specified herein.

4.2 Responsibility for Inspection

Unless otherwise specified in the contract, the contractor shall be responsible for the performance of all inspection requirements and may use his own or any other facilities suitable for the performance of the inspection requirements. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to the prescribed requirements.

4.3 Product Qualification Test (PQT)

Inspections, analyses, demonstrations and tests verify compliance of Section 3 of this specification on the first production unit.

4.4 Production Acceptance Test (PAT)

Each module delivered to the Government undergoes an Acceptance Test Process as identified in Table 9. The acceptance test verifies that the module interfaces are operating properly prior to delivery to the Government.

4.5 Verification Cross Reference Matrix (VCRM)

Table 9 provides a list of each Section 3 requirement and the verification method to be used. The following paragraphs define the codes employed in the VCRM. Unless otherwise noted, where more than more one verification method is shown, one method or a combination of methods may be used to show compliance.

4.5.1 Not Required (N/R)

This method indicates that verification is not required because the paragraph is a title, heading, general introductory paragraph or statement of a goal and contains no “shall” or “must” statements.

4.5.2 Inspection

Inspection is a method of verification of the module performance or characteristics by examination of the equipment or associated documentation. Inspections are conducted with the use of inspection tools, measurement devices, visual means and comparison. Most inspections apply to verification of requirements associated with physical characteristics such as size, weight,

appearance, adherence to specified standards and engineering practices, quality design, and construction supported with quality documentation. Inspections also include the auditing of manufacturer's data that verifies the performance of non-developmental items that comprise the TDC ICAP module. Inspections may occur during any assembly stage of the unit under test.

4.5.3 Analysis

Analysis is a method of verification through technical evaluation of calculations, computations, models, analytical solutions, use of studies, reduced data, and/or representative data to determine that the item conforms to the specified requirements.

4.5.4 Demonstration

Demonstration is a method of verification whereby the properties, characteristics and parameters of the item are determined by observation alone and without the use of instrumentation for quantitative measurements. This method is used when a requirement does not contain a specific numerical parameter that must be measured. Demonstrations may occur during verification of a unit under test at any assembly stage. Pass/fail criteria are simple yes/no indications of functional performance since no quantitative values are specified.

4.5.5 Test

Test is a method to verify that a specified requirement is met by thoroughly exercising the applicable item under specified conditions and by using the appropriate instrumentation in accordance with test procedures. This method requires the use of laboratory equipment, simulators, or services to verify compliance to the specified requirements. This method is used when it is practicable to make direct or indirect measurement of a specified numerical parameter to verify compliance with a requirement. Tests may occur during verification of a unit at any assembly stage. Actual measured values are recorded, and pass/fail is determined by comparing the measured value with the specified value. Measurement accuracy is precise enough to ensure that the measured value is within the specified tolerance.

Table 9 - Verification Cross Reference Matrix

Paragraph	Title	N/R	Verification Method				
			PQT				ATP
			Inspect	Analysis	Demo	Test	
3.	REQUIREMENTS	X					
3.1	Module Definition	X					
3.2	Performance Capabilities	X					
3.2.1	Electrical Interface (External)	X					
3.2.1.1	Prime Power					X	X
3.2.1.2-6	Connectors				X		X
3.2.2	Electrical Interface (Internal)				X		X

Table 9 - Verification Cross Reference Matrix

Paragraph	Title	Verification Method					
		N/R	PQT				ATP
			Inspect	Analysis	Demo	Test	
3.2.3	Functional Requirements	X					
3.2.3.1	TSSR DR-MUX				X		X
3.2.3.2	Cisco 2621XM Modular Access Router				X		X
3.2.3.3	Router Configuration & Status				X		X
3.2.3.4	SI Tech T1 Fiber Optic Bit Driver				X		X
3.2.4	Configuration Options	X					
3.2.5	Physical Characteristics	X					
3.2.5.1	Transit Case		X				
3.2.5.2	Weight		X				
3.2.5.3	Storage Space		X				
3.2.5.4	Lightning Protection/Power Line Conditioning		X				
3.2.5.5	Marking		X				
3.2.6	Cables and Accessories					X	X
3.2.6.1	TIUv2 to TSSR Baseband Assembly Input				X		X
3.2.6.2	TIUv2 to TSSR Baseband Assembly Output				X		X
3.2.6.3	Power				X		X
3.2.7	Reliability			X			
3.2.8	Maintainability			X			
3.2.8.1	Mean Time Between Preventive Maintenance [MTBPM]			X			
3.2.9	Environmental Conditions	X					
3.2.9.1	Temperature					X	
3.2.9.2	Relative Humidity and Altitude			X			
3.2.9.3	Sand and Dust			X			
3.2.9.4	Shock					X	
3.2.9.5	Vibration					X	
3.3	Design and Construction	X					
3.3.1	Materials Parts and Processes			X			
3.3.2	Safety	X					
3.3.2.1	Electrical Safety			X	X		

Table 9 - Verification Cross Reference Matrix

Paragraph	Title	Verification Method					
		N/R	PQT				ATP
			Inspect	Analysis	Demo	Test	
3.3.2.2	Mechanical Safety			X			
3.4	Logistics			X			

5.0 PREPARATION FOR DELIVERY

Each module is packaged for shipment and the package marked in accordance with the requirements of the contract under which the module is ordered.

6.0 BASELINE CONFIGURATION

6.1 Equipment

Table 10 - Equipment Listing

Device	Manufacturer	Part Number	Description	Quantity
Router	Cisco	CISCO2621XM	Modular Router	1
Memory	Cisco	MEM2600XM-32U64D	Memory Module, 32 to 48 MB DRAM	1
CSU/DSU	Cisco	WIC-1DSU-T1	Integrated CSU/DSU for 2621	2
Modem	SI Tech	2890-2R-ASP-1	Dual Fiber Optic T1 Modem	1
Mux	Tadiran	903405	4 x T1 Mux	1
Media Converter	Transition Networks	E-TBT-FRL-05	10Base-T to 10BaseFL Media Converter	1
Media Converter	Transition Networks	SBFTF1011-100	10/100BaseTX to 100BaseFX Bridging Media Converter	1
Conditioner	Marway	MPD411130	Power Conditioner	1
Power Supply	Ault	SW109MA0002F02	Media Converter 110/220 power supply	2
(W1) Cable	TBD	TBD	10BaseFL XCVR to I/O DF	1
(W2) Cable	TBD	TBD	T1 Voice Backbone	1
(W3) Cable	TBD	TBD	T1 Voice Backbone	1
(W4) Cable	TBD	TBD	Cisco 2621XM Console Port Cable	1
(W5) Cable	TBD	TBD	RF Input to 4xT1 Mux	1
(W6) Cable	TBD	TBD	RF Output from 4xT1 Mux	1
(W7) Cable	TBD	TBD	Ethernet 10BaseTX Cisco 2621XM to Media Converter	1
(W8) Cable	TBD	TBD	SI Tech T1 Fiber Bit Driver to 4xT1 Mux	1
(W9) Cable	TBD	TBD	SI Tech T1 Fiber Bit Driver to 4xT1 Mux	1
(W10) Cable	TBD	TBD	Cisco 2621XM Router T1 CSU/DSU Ports to 4xT1 Mux	1
(W11) Cable	TBD	TBD	Cisco 2621XM Router T1 CSU/DSU Ports to 4xT1 Mux	1
(W12) Cable	TBD	TBD	100BaseFL Bridging Media Converter to I/O DF	1
(W13) Cable	TBD	TBD	Ethernet 100BaseTX Cisco 2621XM to Bridging Media Converter	1
(W14) Cable	TBD	TBD	Media Converter Y Power cable	1
(W15) Cable	TBD	TBD	Router Power Cord	1

Table 10 - Equipment Listing

Device	Manufacturer	Part Number	Description	Quantity
(P1) Cable (In Pouch)	TBD	TBD	Cable, Module Admin	1
(P2) Cable (In Pouch)	TBD	TBD	Fiber Optic Cable	2
(P3) Cable Reel	TBD	TBD	RG-59 Cable TX/RX (Pair) 100M each	1
Case	ECS	11721	Transit Case	1
Drawer	ECS Composites	52002735	Storage Drawer	1
Connector	Amphenol	31-220N	Bulkhd Coax Connector	2
Connector	Fiber System Intl	BSTA2000	Bulkhd Coupler	8
Connector	Panel Comp Corp	83011060	Connector	1

6.2 Elevation Drawings

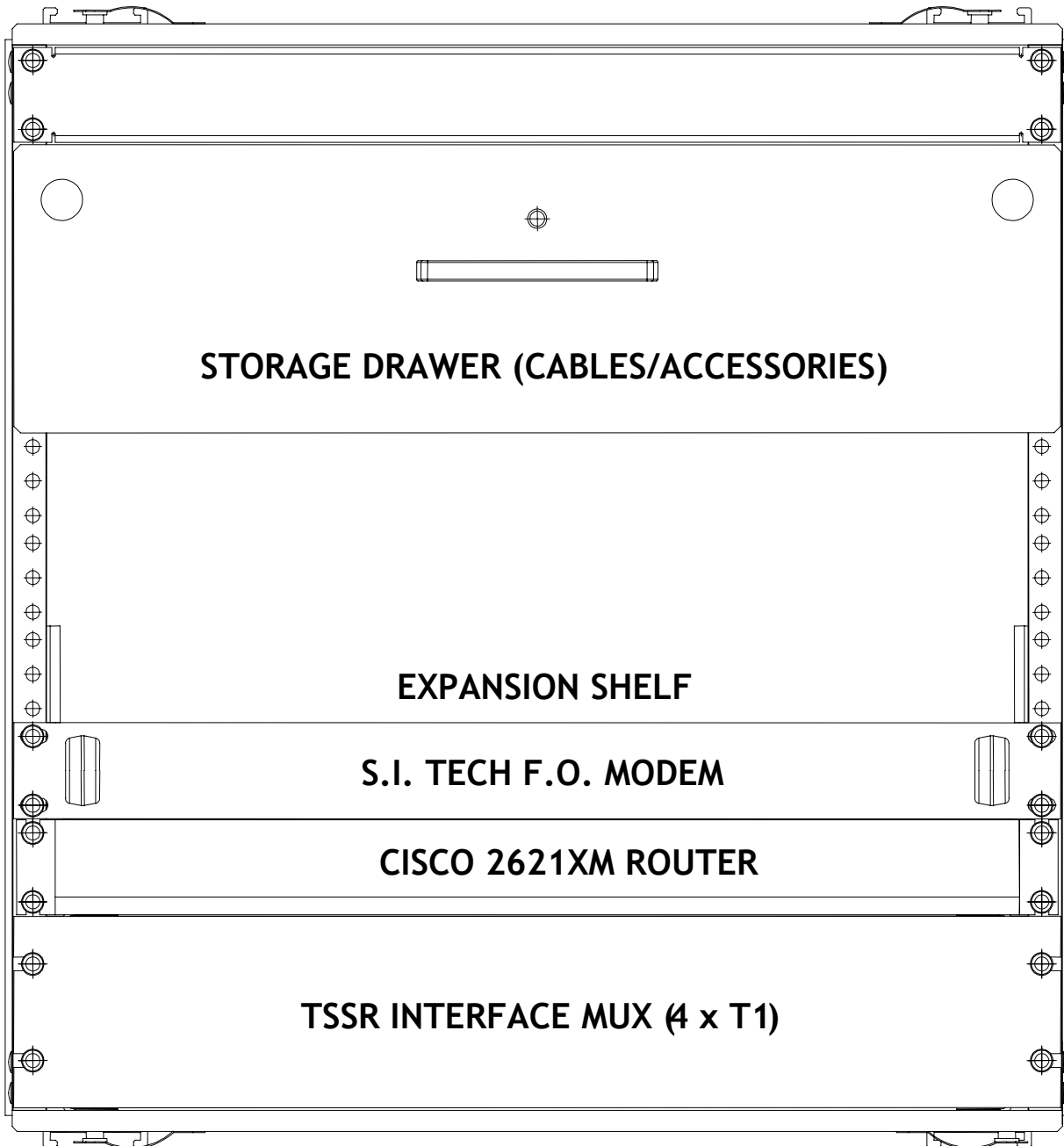


Figure 3 - Front Elevation

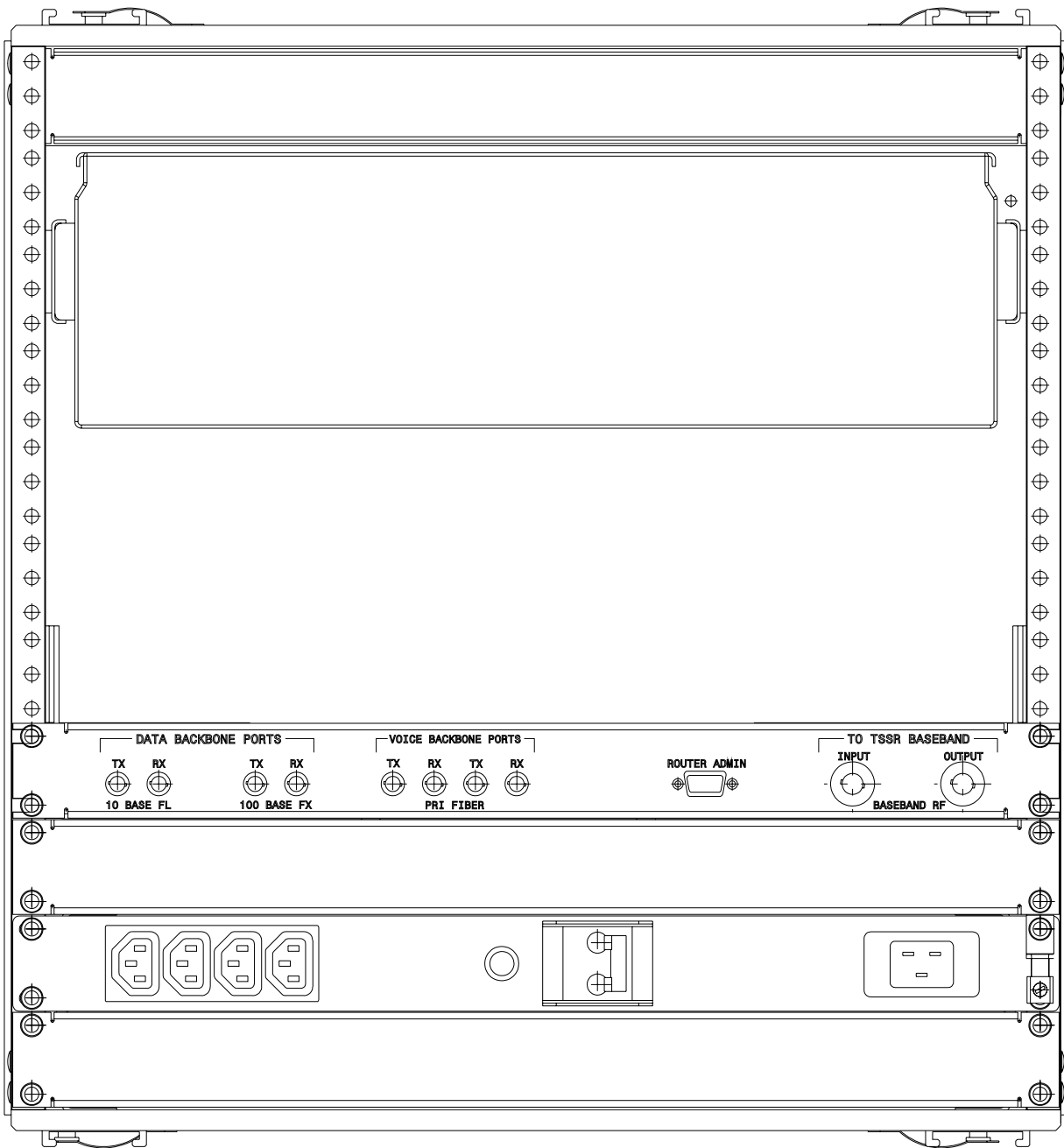


Figure 4 - Rear Elevation

6.3 Cable Diagrams

Table 11 - Cable Diagrams

Wire Number	Manufacturer	Part Number	Description
W1	TBD	TBD	10BaseFL XCVR to I/O DF
W2	TBD	TBD	T1 Voice Backbone
W3	TBD	TBD	T1 Voice Backbone
W4	TBD	TBD	Cisco 2621XM Console Port Cable
W5	TBD	TBD	RF Input to 4xT1 Mux
W6	TBD	TBD	RF Output from 4xT1 Mux
W7	TBD	TBD	Ethernet 10BaseTX Cisco 2621XM to Media Converter
W8	TBD	TBD	SI Tech T1 Fiber Bit Driver to 4xT1 Mux
W9	TBD	TBD	SI Tech T1 Fiber Bit Driver to 4xT1 Mux
W10	TBD	TBD	Cisco 2621XM Router T1 CSU/DSU Ports to 4xT1 Mux
W11	TBD	TBD	Cisco 2621XM Router T1 CSU/DSU Ports to 4xT1 Mux
W12	TBD	TBD	100BaseFL Bridging Media Converter to I/O DF
W13	TBD	TBD	Ethernet 100BaseTX Cisco 2621XM to Bridging Media Converter
W14	TBD	TBD	Media Converter Y Power Cable
W15	TBD	TBD	Router Power Cord
P1	TBD	TBD	Module Admin Cable (stored in pouch)
P2	TBD	TBD	Fiber Optic Cable (stored in pouch)
P3	TBD	TBD	RG-59 Cable (on reel)

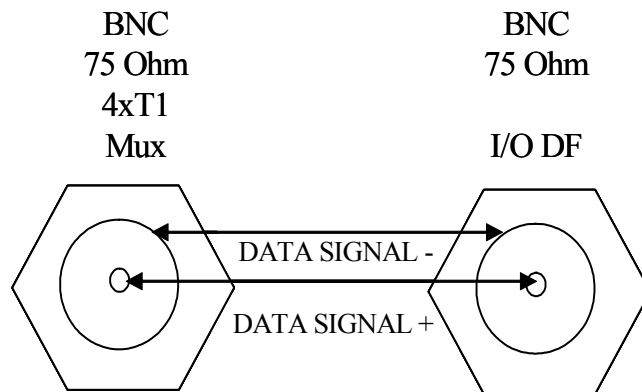
	Cable W1 10BaseFL XCVR to I/O DF Pin Assignments					
		Fiber Optic Cable				
	ST				ST	
	Plug				Plug	
	Media Converter				I/O DF	
			ST	Directio n		
		1	Tx	---->	1	
		2	Rx	<----	2	

	Cable W2 T1 Voice Backbone Pin Assignments					
		Fiber Optic Cable				
	ST				ST	
	Plug				Plug	
	FO Modem				I/O DF	
			ST	Directio n		
		1	Tx	---->	1	
		2	Rx	<----	2	

	Cable W3 T1 Voice Backbone Pin Assignments Fiber Optic Cable					
	ST Plug	FO Modem	ST	Direction	ST Plug I/O DF	
			1 Tx	---->	1	
			2 Rx	<----	2	

	Cable W4 Cisco 2621XM Console Port Cable Pin Assignments				
		RJ45 (SOLID)		DB09F	
	Plug			Receptacle	
	Cisco 2621XM Router			I/O DF	
	Console Port			I/O DF J4	
		Signal	Direction		
	1		----	8	
	2	DTR	---->	6	
	3	TxD	---->	2	
	4	GND	----	5	
	6	RxD	<----	3	
	7	DSR	<----	4	
	8		----	7	

Cable W5, W6
RF Input to 4xT1 Mux
RF Output from 4xT1 Mux
BNC Male to BNC Male, 75 OHM, RG59B/U COAX
USES STANDARD 50 OHM INTERFACE CONNECTORS
Pin Assignments



Cable W7, W13
Ethernet 10BaseTX Cisco 2621XMto Media Converter
Ethernet 100BaseTX Cisco 2621XMto Bridging Media Converter

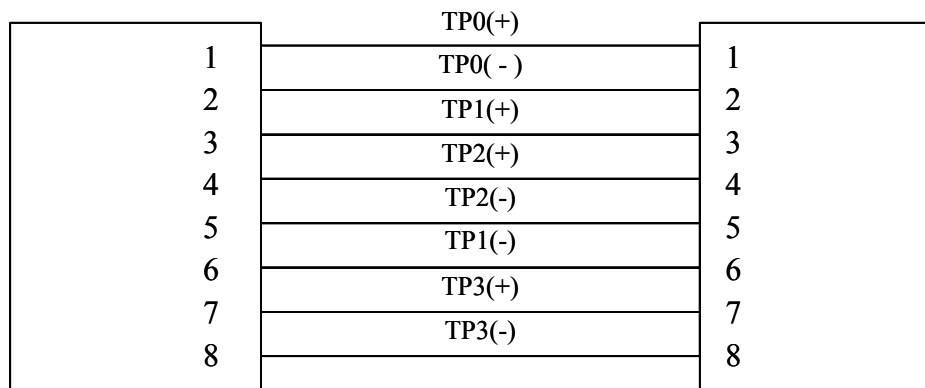
RJ45 (SOLID)
Plug

Cisco 2621XM
10BaseTX Port

RJ45 (SOLID)
Plug

Media
Converter
10/100BaseTX

Signal

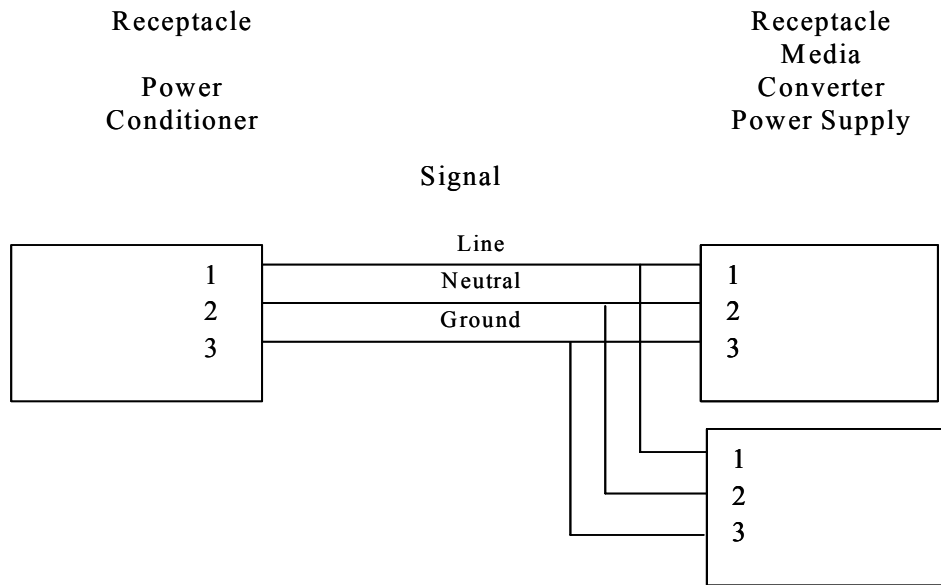


Cable W8 & W9 FO Modem to 4xT1 Mux Pin Assignments					
		RJ45 (STRAND)		DB9M	
	Plug			Plug	
	Cisco 2621 CSU Port			I/O DF J5	
		Signal	Direction		
	1	Rcv Ring	<----	8	
	2	Rcv Tip	<----	3	
	4	Ring	---->	1	
	5	Tip	---->	6	

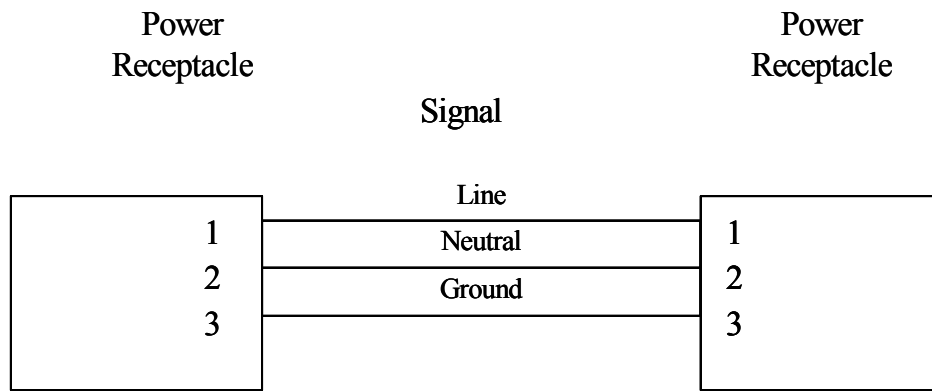
Cable W10 & W11 Cisco 2621XM Router T1 CSU/DSU Ports to 4xT1 Mux Pin Assignments					
	DB15M			DB9M	
	Plug			Plug	
	Fiber Bit Driver			Radio Baseband Ports 3 & 4	
		Signal	Direction		
	1	Tip	<----	6	
	2	Gnd	----	2,7	
	3	Rcv Tip	---->	3	
	9	Ring	<----	1	
	11	Rcv Ring	---->	8	

	Cable W12 100BaseFX Bridging Media Converter to I/O DF Pin Assignments					
		Fiber Optic Cable				
	ST				ST	
	Plug				Plug	
	10BaseFL Bridging Media Converter				I/O DF	
			ST	Directio n		
		1	Tx	---->	1	
		2	Rx	<----	2	

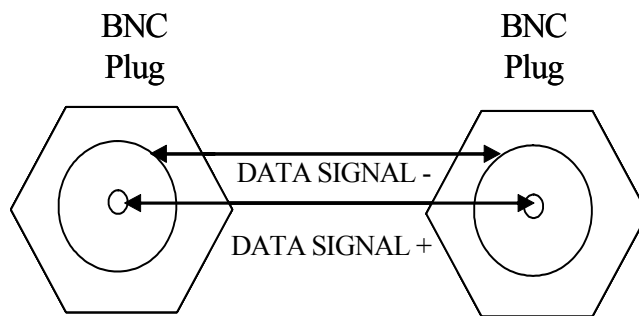
Cable W14
Media Converter Y Power Cable



Cable W15
Router Power Cable



Cable P3
RG59 Cable (on reel)
Pin Assignments



	Cable P1 Pin Assignments				
	Module Admin Cable (stored in pouch)				
	DB9F			DB9M	
	Receptacle			Plug	
	Laptop COM port			I/O DF	
	Terminal			Various Admin	
	DTE				
		Signal	Direction		
	2	RD	<----	2	
	3	TD	---->	3	
	4	DTR	---->	4	
	5	GND	-----	5	
	6	DSR	<----	6	
	7	RTS	---->	7	
	8	CTS	<----	8	

Cable P2 Fiber Optic Cable (stored in pouch) Pin Assignments			
ST			ST
Plug			Plug
	Signal	Direction	
1	Tx	→	1
2	Rx	←	2

Cable P3 RG59 Cable (on reel) Pin Assignments			
	BNC	BNC	
	Plug	Plug	

6.4 Interconnection Diagrams

